What Is Claimed Is:

1. A spark-ignition engine controller for a multi-cylinder spark ignition engine set such that the combustion cycle of each cylinder has a predetermined phase difference, said spark-ignition engine controller comprising:

an operation mode controller for performing control such that a control mode for engine intake, exhaust, and combustion in a partial load range of the engine is set as a special operation mode, and in the special operation mode a two-cylinder connection is maintained in which burned gas discharged in the exhaust stroke of a preceding cylinder of a pair of cylinders having an overlapping exhaust stroke and intake stroke is introduced as is into a following cylinder during the intake stroke thereof through an intercylinder gas channel and exhaust gas discharged from the following cylinder is introduced into an exhaust passage, while combustion is performed in the preceding cylinder at a leaner air-fuel ratio than the stoichiometric air-fuel ratio, and combustion is performed in the following cylinder by feeding fuel to the lean air-fuel ratio burned gas introduced into the following cylinder from the preceding cylinder;

a combustion condition controller for performing control such that in the operating range set as said special operation mode, combustion is performed in the following cylinder by compression ignition; and

a fuel injection controller which, in an operating condition in a low load range within the compression ignition range of said following cylinder, sets the fuel injection timing into the following cylinder in an intake stroke and which, in an operating condition in a high load range within the compression ignition range of said following cylinder, retards the fuel injection timing into the following cylinder to be in a later half of the compression stroke.

2. The spark-ignition engine controller according to claim 1, wherein, in an operating condition in which knocking is likely to occur within the compression ignition range of the following cylinder, fuel is injected into the following cylinder in split, and the timing of fuel injection in a later stage of said split injection is set to the latter half of the compression stroke.

3. The spark-ignition engine controller according to claim 2, wherein, in the compression ignition range of the following cylinder, the probability of knocking occurrence is detected, and the later stage injection timing during said split fuel injection is retarded further towards top dead center of compression stroke as the probability of knocking occurrence increases.

4. The spark-ignition engine controller according to claim 2, wherein, in an operating condition in a low load range within the compression ignition range of the following cylinder, a fuel injection timing into the preceding cylinder is set to

be in a compressed stroke for enabling a stratified charge combustion and a fuel injection timing to the following cylinder is set to be in an intake stroke for enabling a compression ignition in a uniformly dispersed fuel mixture, and in an operating condition in a high load range within the compression ignition range of the following cylinder, a fuel injection timing into the following cylinder is set to be at least one in the compression stroke.

5. The spark-ignition engine controller according to claim 4, wherein, in the compression ignition range of the following cylinder, the probability of knocking occurrence is detected, and the proportion of the latter stage injection quantity with respect to a total injection quantity of fuel injected into the following cylinder is increased as the probability of knocking occurrence rises.

6. The spark-ignition engine controller according to claim 1, further comprising a knocking determination unit that determines knocking likely occurs when a low-octane fuel is used, the more likely knocking is determined to occur in the compression ignition range of the following cylinder according to the knocking determination unit, the more retarded a fuel injection timing into the following cylinder is set.

7. The spark-ignition engine controller according to claim 1, further comprising a swirl generator for generating

swirl such that when the engine is in an operating condition in which knocking is likely to occur within the compression ignition range of the following cylinder, a high turbulence intensity is maintained in the latter half of the compression stroke.

8. The spark-ignition engine controller according to claim 7, wherein an end part of the intercylinder gas channel is oriented in a tangential direction to the following cylinder when seen from a cylinder axial direction, and burned gas is introduced from said intercylinder gas channel into the following cylinder in the intake stroke of the following cylinder such that swirl is generated inside the combustion chamber.